

Chemistry of Life

Nonpolar covalent bonds: electrons shared equally between atoms
pH scale: between 0 and 14,

Polar covalent bonds: one atom has greater electronegativity unequal sharing of electrons
acids: excess of H⁺ ions
pH < 7

Ionic bonds: chemical bonds from attraction between charged ions
Bases: excess of OH⁻
pH > 7

Hydrogen bonds: weak bonds between partial + charged hydrogen atom and electronegative oxygen/nitrogen of another, cause Cohesion (sticking of like molecules), adhesion (sticking of unlike molecules), and transpiration (movement of water molecules in plants)

Specific heat: amount of heat required to raise or lower temp by 1 degree C

Respiration/Fermentation

Glycolysis: breakdown two pyruvate (glucose) into 2 pyruvate + 2 H₂O, 2 ATP, 2 NADH + 2H⁺

Pyruvate Oxidization: pyruvate turns into CO₂, NADH, Acetyl CoA

Citric Acid/Krebs cycle: starts w/ acetyl CoA turns into 2CO₂, 3NADH, 1ATP, 1FADH

ETC: pumping of protons to create a gradient which powers chemiosmosis

Chemiosmosis: ATP synthesis powered by ETC

Total yield: 30-32 ATP (2 from glycolysis, 2 from citric acid, 26-28 from oxidative phosphorylation)

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP$

Respiration/Fermentation (cont)

fermentation: expansion of glycolysis where ATP is produced by substrate level phosphorylation, anaerobic

Macromolecules

Monosaccharide: monomer of carbs	Lipids: function is energy/protection	Proteins: polymers made of amino acid monomers, linked by peptide bonds	Nucleic acids: DNA and RNA, monomers are nucleotides
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polysaccharides: polymers of carbs	steroids: four rings fused together	Primary structure: amino acid sequence	Made of nitrogenous base, 5 carbon sugar and a phosphate group
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Energy-storing polysaccharides: starch, glycogen	Structural polysaccharides: cellulose, chitin	Secondary: hydrogen bonding results in alpha helix or beta pleated sheet	tertiary: complex shapes from bonding between R groups
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Macromolecules (cont)

"Quaternary" two or more polypeptide chains into one large protein

The Cell

Ribosomes: protein factories	Isotonic solution: same amount of solute
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Endoplasmic Reticulum: smooth (synthesis of lipids, package to transport vesicles), rough (synthesize proteins)	Hypertonic: more solute
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Golgi apparatus (receives, sorts, ships)	hypotonic: less solute
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Endosymbiont theory: mitochondria and chloroplast from prokaryotic cells, have dna and double membrane

peroxisomes: transfer hydrogen to oxygen, detoxify

Energy of Life

Catabolic: release of energy by breakdown of complex to simple

Anabolic: consume energy to make complicated from simple

Exergonic: energy released

Endergonic: requires energy

